

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. – 33. (canceled).

34. (currently amended): A method of producing a semiconductor device comprising the steps of:

forming a plurality of pyramid-shaped bump electrodes of the semiconductor device; and

connecting the pyramid-shaped bump electrodes to pad electrodes of the semiconductor device;

wherein said step of forming the plurality of pyramid-shaped bump electrodes includes:

a step of forming pyramid-shaped etched holes by anisotropically etching a base material having a crystal orientation, and

a step of filling up the etched pyramid-shaped holes by plating a metal to form the pyramid-shaped bump electrodes, wherein the_a shape of the pyramid-shaped bump electrodes is identical to a shape of the etched pyramid-shaped holes; and

wherein the step of connecting the pyramid-shaped bump electrodes to the pad electrodes includes:

a step of attaching the base of the pyramid-shaped bump electrodes to the pad electrodes, and

a step of transferring the pyramid-shaped bump electrodes to the pad electrodes,

wherein the pyramid-shaped bump electrodes are each formed by a conductive material, and

wherein the pyramid-shaped bump electrodes have a shape of a pyramid, which is a figure having a square base and four triangle-shaped sides, and
wherein the four triangle-shaped sides meet at a common point.

35. (previously presented): A method of producing a semiconductor device according to claim 34,

wherein between said step of forming etched holes and said step of filling up the etched holes, further includes

a step of forming a primary film of the same material as the metal for said plating of the metal on said base material having a crystal orientation and on a side surface of each of said etched holes, thereby filling up the etched holes by plating the metal by using said primary film.

36. (previously presented): A method of producing a semiconductor device according to claim 34,

wherein before said step of forming said etched holes, further includes

a step of forming a first pattern having opening portions at positions corresponding to the etched holes by etching a first oxidized film formed on said base material having the crystal orientation, and

a step of forming said etched holes by using the first pattern as a mask.

37. (previously presented): A method of producing a semiconductor device according to claim 34,

wherein said step of forming the plurality of pyramid-shaped bump electrodes includes;

a step of forming a first pattern having opening portions at positions corresponding to the etched holes by etching a first oxidized film formed on said base material having the crystal orientation, and

a step of forming said etched holes by using the first pattern as a mask,

a step of removing the first oxidized film,

a step of forming a second oxidized film anew on the etched holes, and

a step of filling up the etched holes by plating a metal.

38. (previously presented): A method of producing a semiconductor device according to claim 34,

wherein after said step of filling up the etched holes by plating a metal, further includes a step of forming a gold plated film on the metal plated film.

39. (previously presented): A method of producing a semiconductor device according to claim 37,

wherein after said step of filling up the etched holes by plating a metal, further includes a step of forming a gold plated film on the metal plated film.

40. (previously presented): A method of producing a semiconductor device according to claim 34,

wherein in said step of filling up the etched holes by plating a metal, Ni is plated as said metal to fill up the etched holes.

41. (previously presented): A method of producing a semiconductor device according to claim 37,

wherein in said step of filling up the etched holes by plating a metal, Ni is plated as said metal to fill up the etched holes.

42. (previously presented): A method of producing a semiconductor device according to claim 34,

wherein in said step of filling up the etched holes by plating a metal, Cu is plated as said metal to fill up the etched holes.

43. (previously presented): A method of producing a semiconductor device according to claim 37,

wherein in said step of filling up the etched holes by plating a metal, Cu is plated as said metal to fill up the etched holes.

44. (previously presented): A method of producing a semiconductor device according to claim 34,

wherein after said step of connecting the pyramid-shaped bump electrodes to pad electrodes of the semiconductor device, further includes a step of forming a gold film on a surface of the pyramid-shaped bump electrodes.

45. (previously presented): A method of producing a semiconductor device according to claim 37,

wherein after said step of connecting the pyramid-shaped bump electrodes to pad electrodes of the semiconductor device, further includes a step of forming a gold film on a surface of the pyramid-shaped bump electrodes.

46. (previously presented): A method of producing a semiconductor device according to claim 35,

wherein in said step of forming a primary film, a Cr film is formed as said primary film for metal plating, and then a Ni film is formed on the Cr film.

47. (previously presented): A method of producing a semiconductor device according to claim 46,

wherein in said step of connecting said pyramid-shaped bump electrodes to pad electrodes of the semiconductor device, said pyramid-shaped bump electrodes are transferred from the base material having the crystal orientation to the pad electrodes by removing said Cr film.

48. (previously presented): A method of producing a semiconductor device according to claim 34,

wherein in said step of connecting said pyramid-shaped bump electrodes to pad electrodes of the semiconductor device, after transferring the pyramid-shaped bump electrodes from the base material having the crystal orientation to the pad electrodes, a step is further included to form a gold film on the surface of the pyramid-shaped bump electrodes.

49. (previously presented): A method of producing a semiconductor device according to claim 37,

wherein in said step of connecting said pyramid-shaped bump electrodes to pad electrodes of the semiconductor device, after transferring the pyramid-shaped bump electrodes from the base material having the crystal orientation to the pad electrodes, a step is further included to form a gold film on the surface of the pyramid-shaped bump electrodes.

50. (previously presented): A method of producing a semiconductor device according to claim 34,

wherein in said step of connecting said pyramid-shaped bump electrodes to pad electrodes of the semiconductor device, said pyramid-shaped bump electrodes and the pad electrodes of the semiconductor device are thermally compressed at 200°C to 300°C, and the pyramid-shaped bump electrodes and the pad electrodes of the semiconductor device are electrically connected through conductive particles connected to an anisotropic conduction sheet.

51. (previously presented): A method of producing a semiconductor device according to claim 34,

wherein in said step of connecting the pyramid-shaped bump electrodes to pad electrodes of the semiconductor device, gold stud bumps formed on the pad electrodes of said semiconductor device and the pyramid-shaped bump electrodes are thermally compressed thereby connecting by forming an alloy.

52. (previously presented): A method of producing a semiconductor device according to claim 34,

wherein in said step of connecting the pyramid-shaped bump electrodes to pad electrodes of the semiconductor device, a Ni film and a gold film formed on the pad electrodes of the semiconductor device, and the pyramid-shaped bump electrodes are thermally compressed thereby connecting by forming an alloy.

53. (currently amended) A method of producing a semiconductor device comprising the steps of:

forming a plurality of pyramid-shaped bump electrodes of the semiconductor device; and

connecting the pyramid-shaped bump electrodes to pad electrodes of the semiconductor device;

wherein said step of forming the plurality of pyramid-shaped bump electrodes includes:

a step of forming a first pattern having openings at positions corresponding to etched holes by etching a first oxidized film formed on a surface of a base material having a crystal orientation,

a step of forming said etched holes by using the first pattern as a mask,

a step of removing the first oxidized film,

a step of forming a second oxidized film anew on the etched holes,

a step of forming a plated feeding film on the base material having the crystal orientation and on a side surface of each of the etched holes,

a step of forming a second pattern of an organic material on the base material having the crystal orientation so that the etched holes are not covered,

a step of filling up the etched holes by plating a metal film on the plated film on the plated feeding film, wherein a shape of the pyramid-shaped bump electrodes is identical to a shape of the etched holes,

a step of forming a gold plated film on the metal film, and

a step of removing the second pattern of the organic material; and

wherein the step of connecting the pyramid-shaped bump electrodes to the pad electrodes includes:

a step of attaching the base of the pyramid-shaped bump electrodes to the pad electrodes, and

a step of transferring the pyramid-shaped bump electrodes to the pad electrodes,

wherein the pyramid-shaped bump electrodes are each formed by a conductive material, and

wherein the pyramid-shaped bump electrodes have a shape of a pyramid, which is a figure having a square base and four triangle-shaped sides, and
wherein the four triangle-shaped sides meet at a common point.

54. (previously presented): A method of producing a semiconductor device according to claim 34,

wherein the plurality of pyramid-shaped bump electrodes is separated from one another at least after the step of connecting the pyramid-shaped bump electrodes to pad electrodes of the semiconductor device.

55. (previously presented): A method of producing a semiconductor device according to claim 34, further including a step of removing the base material from the pyramid-shaped bump electrodes after the step of connecting the pyramid-shaped bump electrodes to pad electrodes of the semiconductor device.

56. (previously presented): A method of producing a semiconductor device according to claim 34,

wherein each of the pyramid-shaped bump electrodes keeps its pyramid shape after the step of connecting pad electrodes of the semiconductor device.

57. (previously presented): A method of producing a semiconductor device according to claim 34,

wherein each tip of the pyramid-shaped bump electrodes is bonded to a terminal formed on a substrate after the step of connecting the pyramid-shaped bump electrodes to pad electrodes of the semiconductor device.

58. (previously presented): A method of producing a semiconductor device according to claim 57,

wherein said each tip of the pyramid-shaped bump electrodes is thermally compressed to the terminal formed on the substrate.

59. (previously presented): A method of producing a semiconductor device according to claim 57,

wherein said each tip of the pyramid-shaped bump electrodes is soldered to the terminal formed on the substrate.

60. (previously presented): A method of producing a semiconductor device according to claim 57, wherein the terminal is provided on a wiring conductor formed on a substrate.

61. (currently amended): A method of producing a semiconductor device comprising the steps of:

forming a plurality of pyramidal bump electrodes of the semiconductor device;
and

connecting the pyramidal bump electrodes to pad electrodes of the semiconductor device;

wherein said step of forming the plurality of pyramidal bump electrodes includes:

a step of forming pyramidal etched holes by anisotropically etching a base material having a crystal orientation, and

a step of filling up the etched pyramidal holes by plating a metal to form the pyramidal bump electrodes, wherein the-a shape of the pyramidal bump electrodes is identical to a shape of the etched pyramidal holes; and

wherein the step of connecting the pyramidal bump electrodes to the pad electrodes includes:

a step of attaching the base of the pyramidal bump electrodes to the pad electrodes, and

a step of transferring the pyramidal bump electrodes to the pad electrodes, wherein the pyramidal bump electrodes are each formed by a conductive material, and

wherein the pyramidal bump electrodes have a shape of a figure comprising a rectangular base and at least two triangle-shaped sides.

62. (currently amended) A method of producing a semiconductor device comprising the steps of:

forming a plurality of pyramidal bump electrodes of the semiconductor device;
and

connecting the pyramidal bump electrodes to pad electrodes of the semiconductor device;

wherein said step of forming the plurality of pyramidal bump electrodes includes:

a step of forming a first pattern having openings at positions corresponding to etched holes by etching a first oxidized film formed on a surface of a base material having a crystal orientation,

a step of forming said etched holes by using the first pattern as a mask,

a step of removing the first oxidized film,

a step of forming a second oxidized film anew on the etched holes,

a step of forming a plated feeding film on the base material having the crystal orientation and on a side surface of each of the etched holes,

a step of forming a second pattern of an organic material on the base material having the crystal orientation so that the etched holes are not covered,

a step of filling up the etched holes by plating a metal film on the plated film on the plated feeding film, wherein a shape of the pyramidal bump electrodes is identical to a shape of the etched holes.

a step of forming a gold plated film on the metal film, and

a step of removing the second pattern of the organic material; and

wherein the step of connecting the pyramidal bump electrodes to the pad electrodes includes:

a step of attaching the base of the pyramidal bump electrodes to the pad electrodes, and

a step of transferring the pyramidal bump electrodes to the pad electrodes, wherein the pyramidal bump electrodes are each formed by a conductive material, and

wherein the pyramidal bump electrodes have a shape of a figure comprising a rectangular base and at least two triangle-shaped sides.